SDB use case

- First french experience for chart adequacy on St Martin Island
- Toward a decision tool for survey planning

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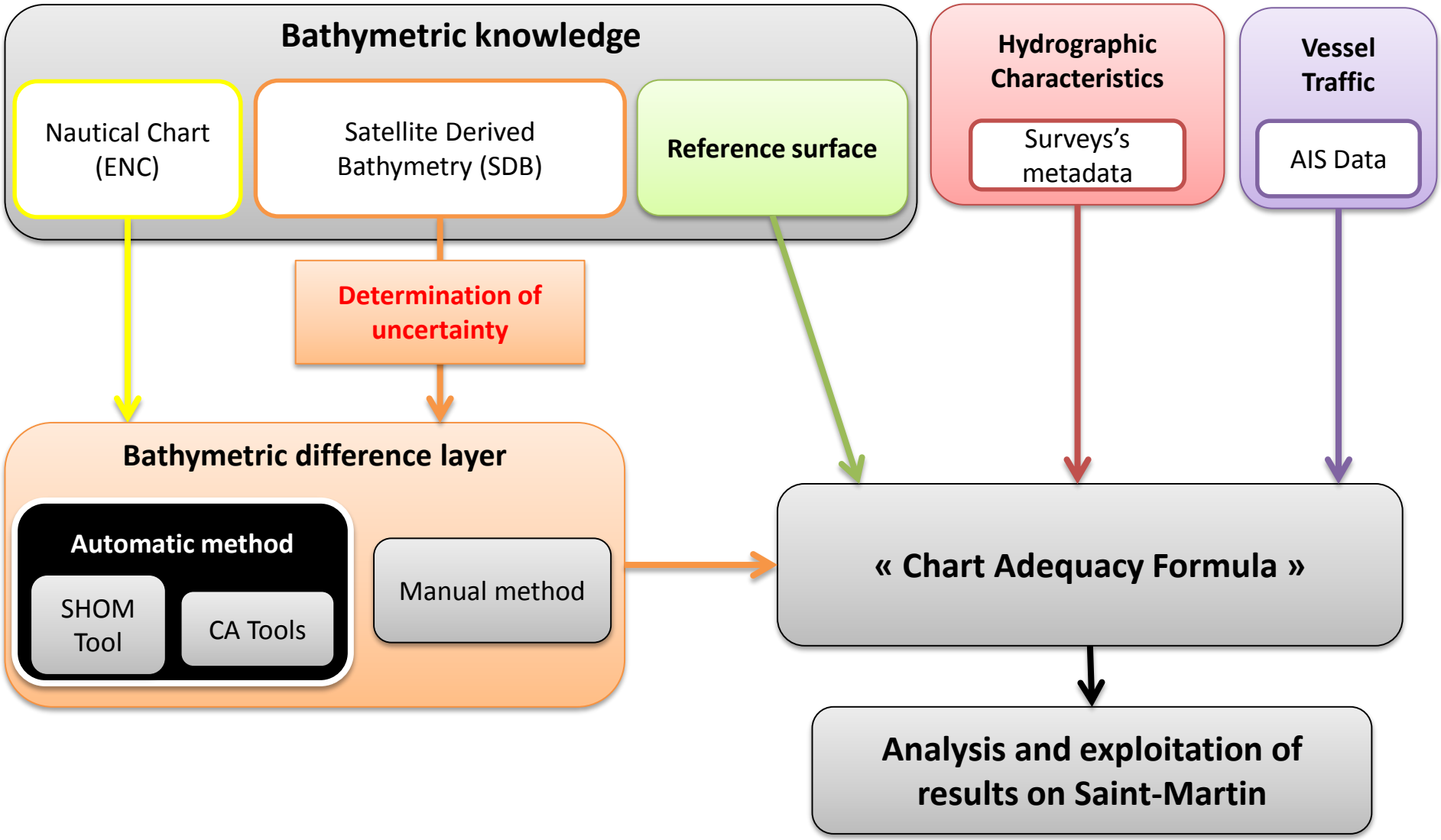
CHART ADEQUACY METHODOLOGY

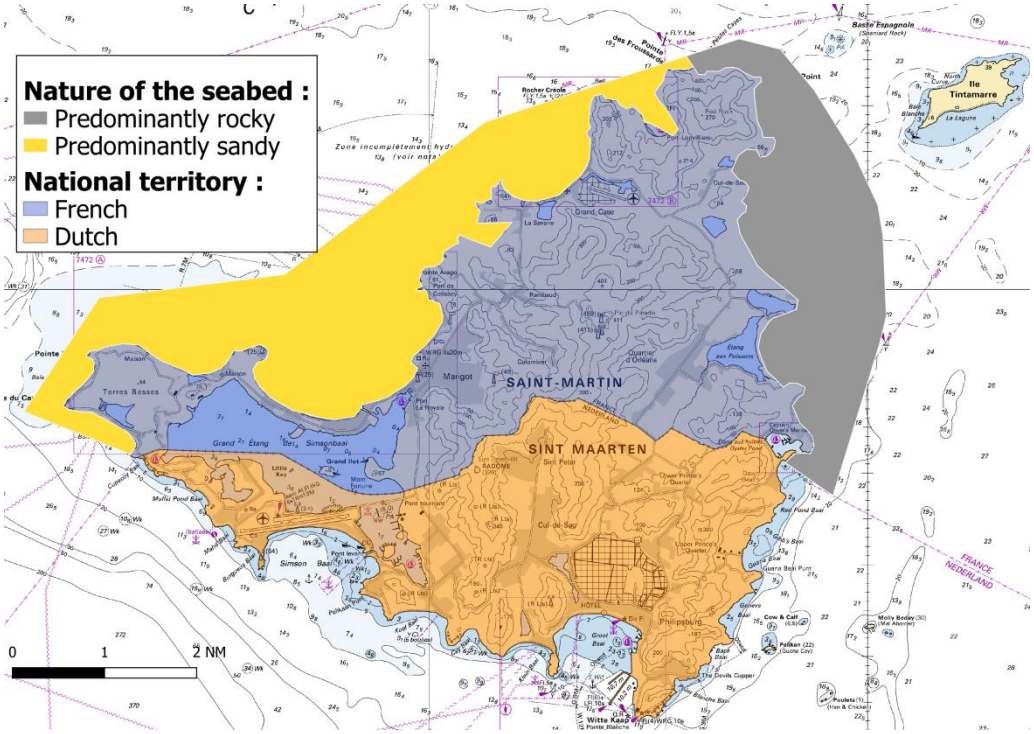


DEFINITION OF THE STUDY AREA

The island of Saint Martin :

- French-Dutch island of 88 km²
- Analysis of storm Irma (5 and 6 of september 2017)

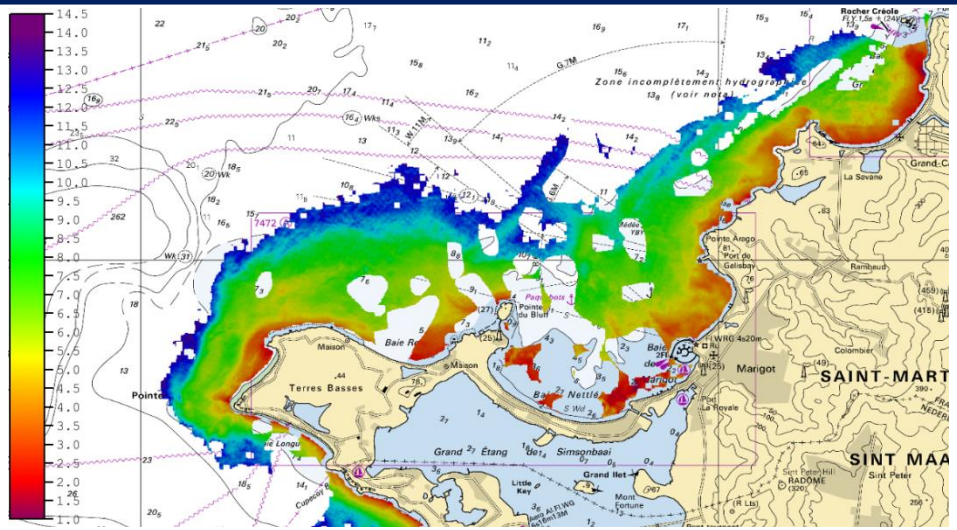
Created by OverlordQ using WikiProject Tropical cyclones/Tracks. The background image is from NASA



SDB MODEL AND ITS UNCERTAINTY

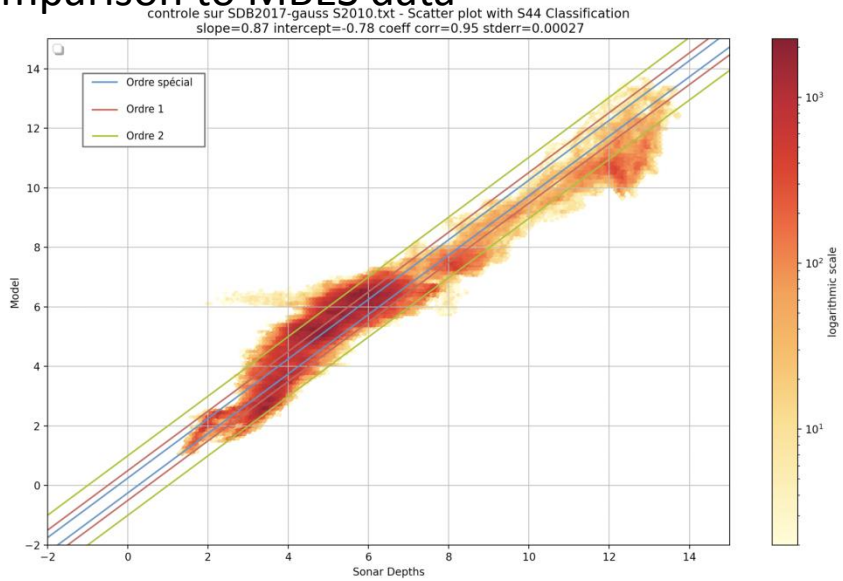
SDB calculation :

With the empirical model derived from the Lyzenga equation
(Sentinel 2A image)



Validation of the SDB model :

Comparison to MBES data

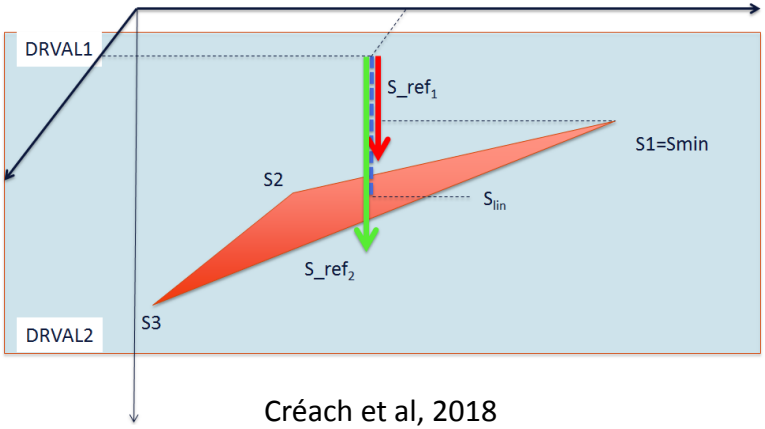


	SDB model
MBES data / SDB coherency	S2010-1-2-10
+-1m (%)	81
+-1.5m (%)	95
+-2m (%)	98
Maximum error (m)	4

AUTOMATION OF THE DISCREPANCIES DETECTION

Comparison between 2 cartographic control tools :

- CA Tools (NOAA)
- Tool from SHOM



Créach et al, 2018

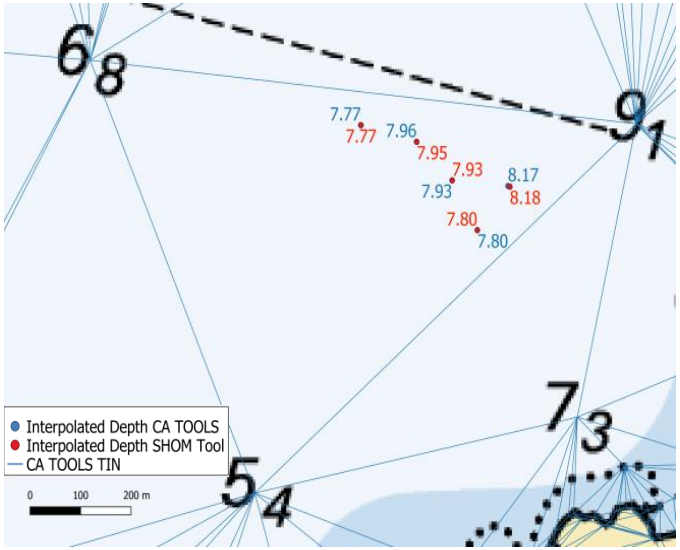
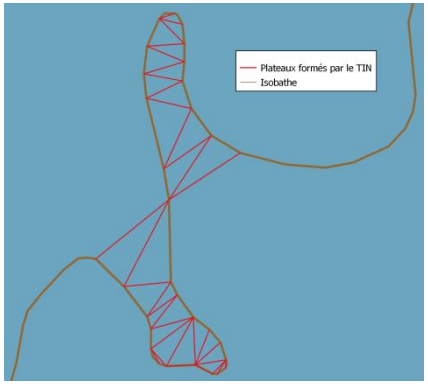


Illustration of interpolated depths on the TIN built from the ENC

SHOM's tool characteristics :

- Limiting plateau effects
- Output file easily usable in a GIS

	// LATITUD	LONGITUDE	Z_LIN	DIFF_LIN	Z_D1	DIFF_D1	Z_MIN	DIFF_MIN	Z
1	18.1191454000...	-63.0535404000...	6.79000000000...	1.79000000000...	5.00000000000...	3.50000000000...	5.00000000000...	3.58000000000...	8.58000000000...
2	18.1191454000...	-63.0534469999...	6.68000000000...	1.58000000000...	5.00000000000...	3.20000000000...	5.00000000000...	3.27000000000...	8.27000000000...
3	18.1191454000...	-63.0533537000...	6.72000000000...	1.31000000000...	5.00000000000...	3.00000000000...	5.00000000000...	3.03000000000...	8.02999999999...



Plateau generated by an isobath

BATHYMETRIC DIFFERENCE RESULT

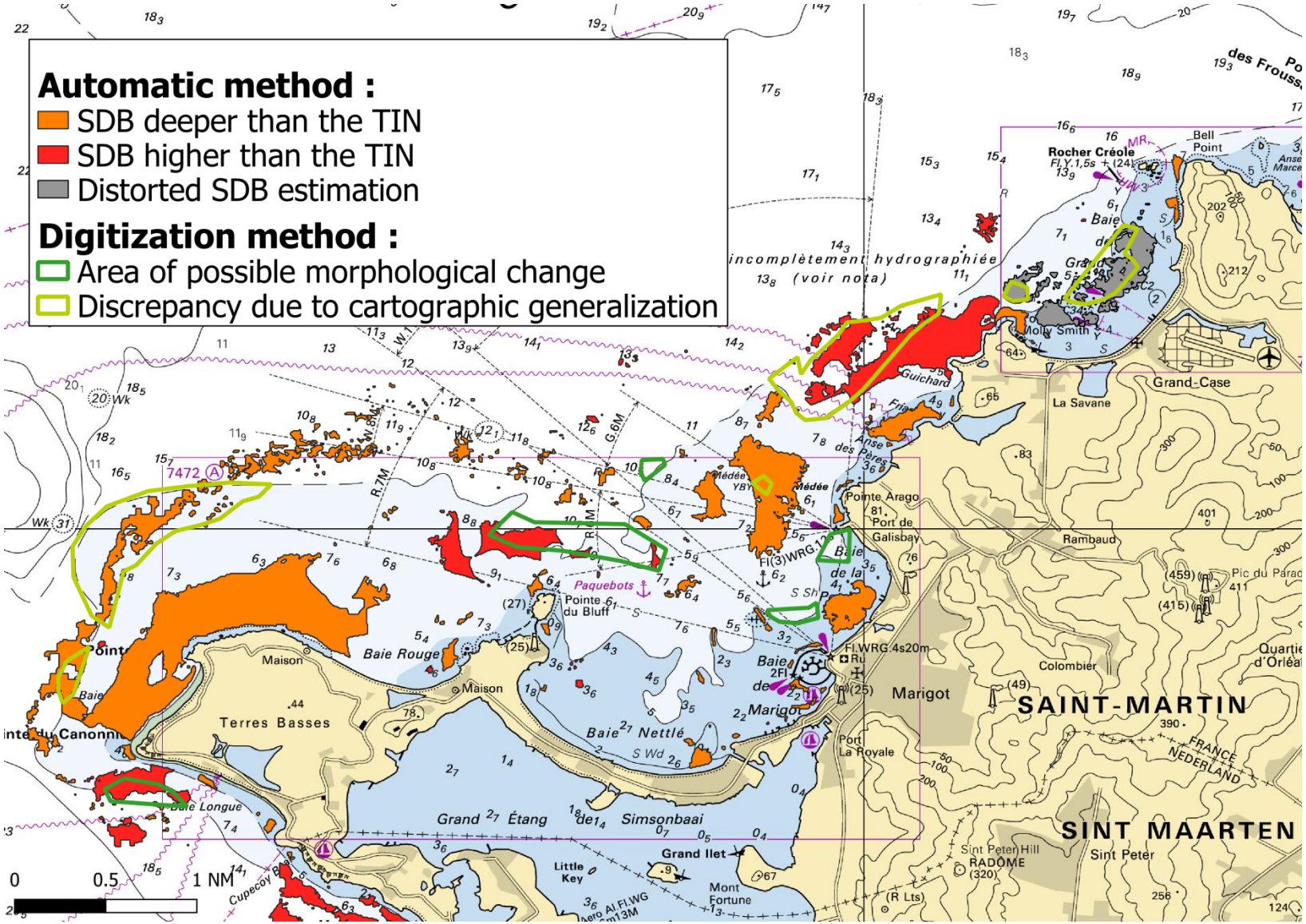
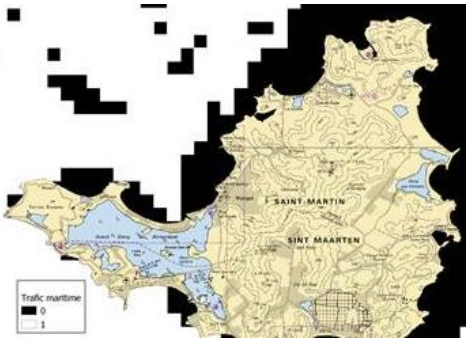
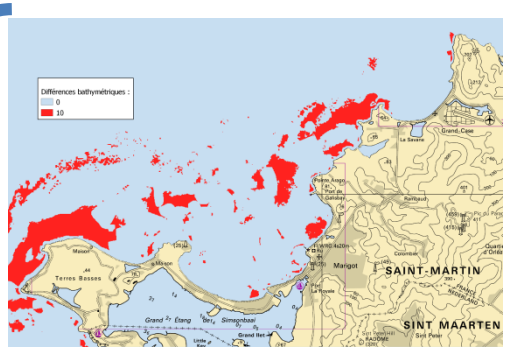


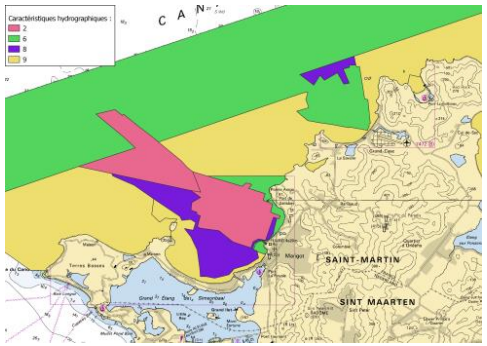
CHART ADEQUACY FORMULA



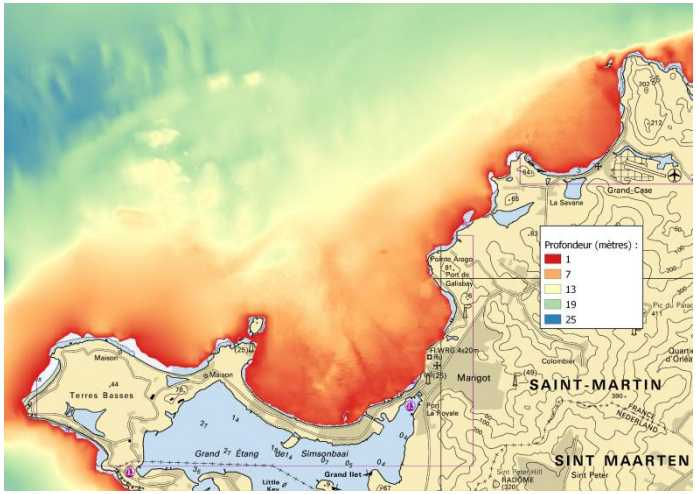
Vessel Traffic [0, 1]



Bathymetric Difference [0, 10]



Hydrographic Characteristics [1-9]

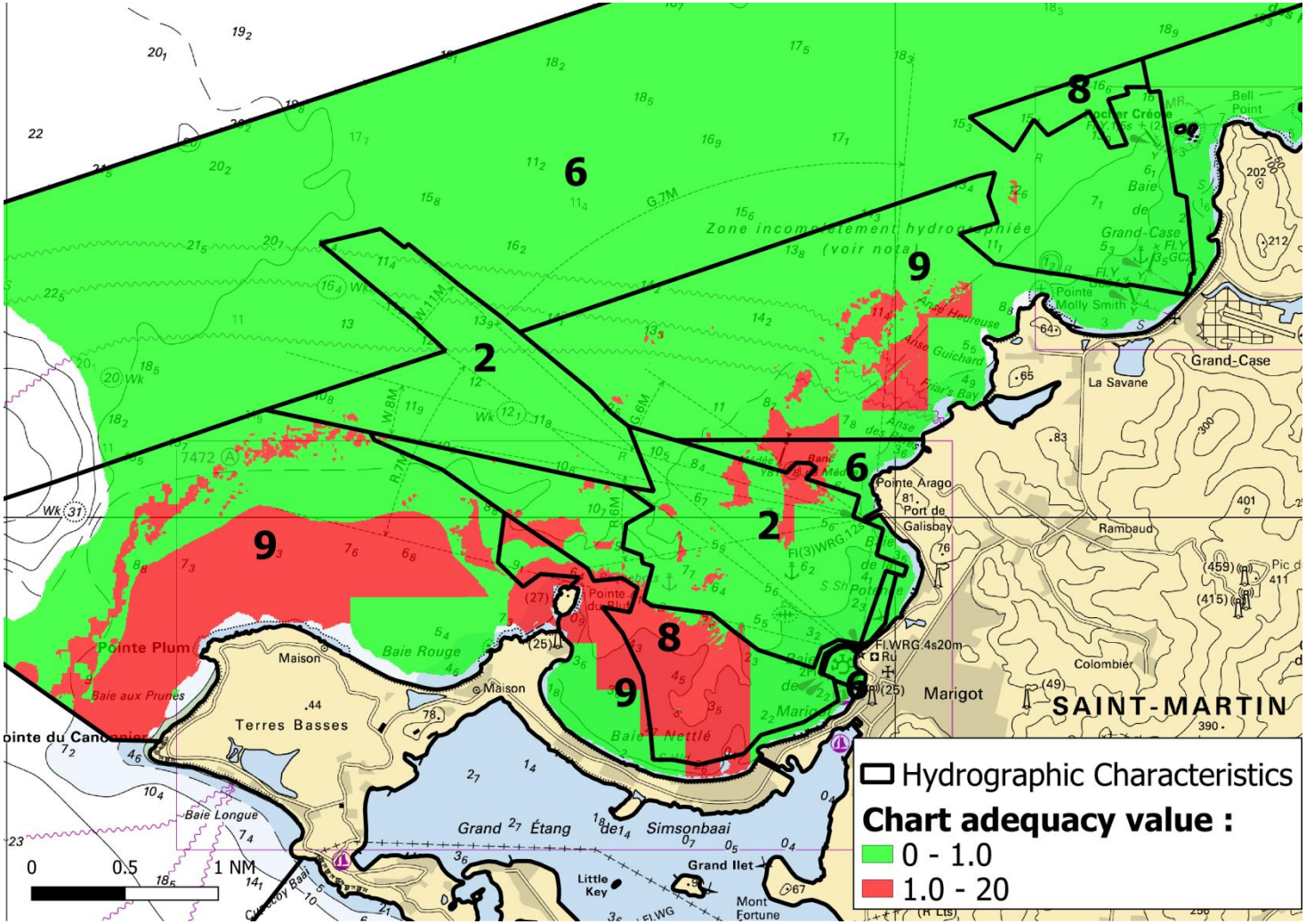


Reference surface [1 to max. depth]

Source : GEBCO Science Day – Kuala Lumpur, Malaysia – 5 October 2015, LT Anthony Klemm

IHO - IOC - « The IHO IOC GEBCO Cookbook ». IHO Publication B-11. IOC Manuals and guides, 63. September 2018

CHART ADEQUACY FINAL PRODUCT



DISCUSSION ON THE RESULTS OF OUR FIRST EXPERIENCE

Benefits of this procedure

⇒ Efficient and low-cost approach to detect bathymetric changes

⇒ Rapid assessment of the chart by merging many sources

Importance of human analysis

⇒ Qualification of the SDB product

⇒ Building of the bathymetric difference layer (even with the automated tool)

Tool implemented in QGIS

⇒ Additional tests

Future work

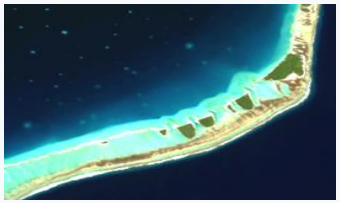
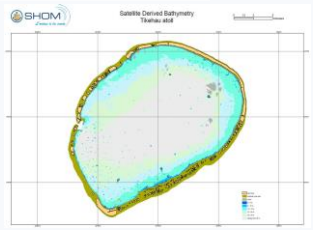
⇒ Cross-referencing with other external information (including CSB)

⇒ Optimize SDB product

- Limit the effects of the variations in sea floor conditions
- Qualify the uncertainties

ONGOING IMPROVEMENTS IN THE SDB' S APPROACH

SDB production line since 1987

Research Project

Integration of latest technological advances

- As efficient and automated as possible
- Without mandatory need of ground control data
- With vertical uncertainties management

Upgrade Shom's production line

Promote SDB use cases

- Nautical updating strategy
- Reconnaissance tool

NAUTICAL UPDATING STRATEGY : SDB CONTRIBUTION

Chart evaluation

⇒ High revisiting capabilities with the free multi temporal images series (Sentinel 2)

⇒ Identify potential bathymetric changes

⇒ Assess the chart adequacy

Toward a decision tool

⇒ Develop a methodology to plan hydrographic survey campaigns

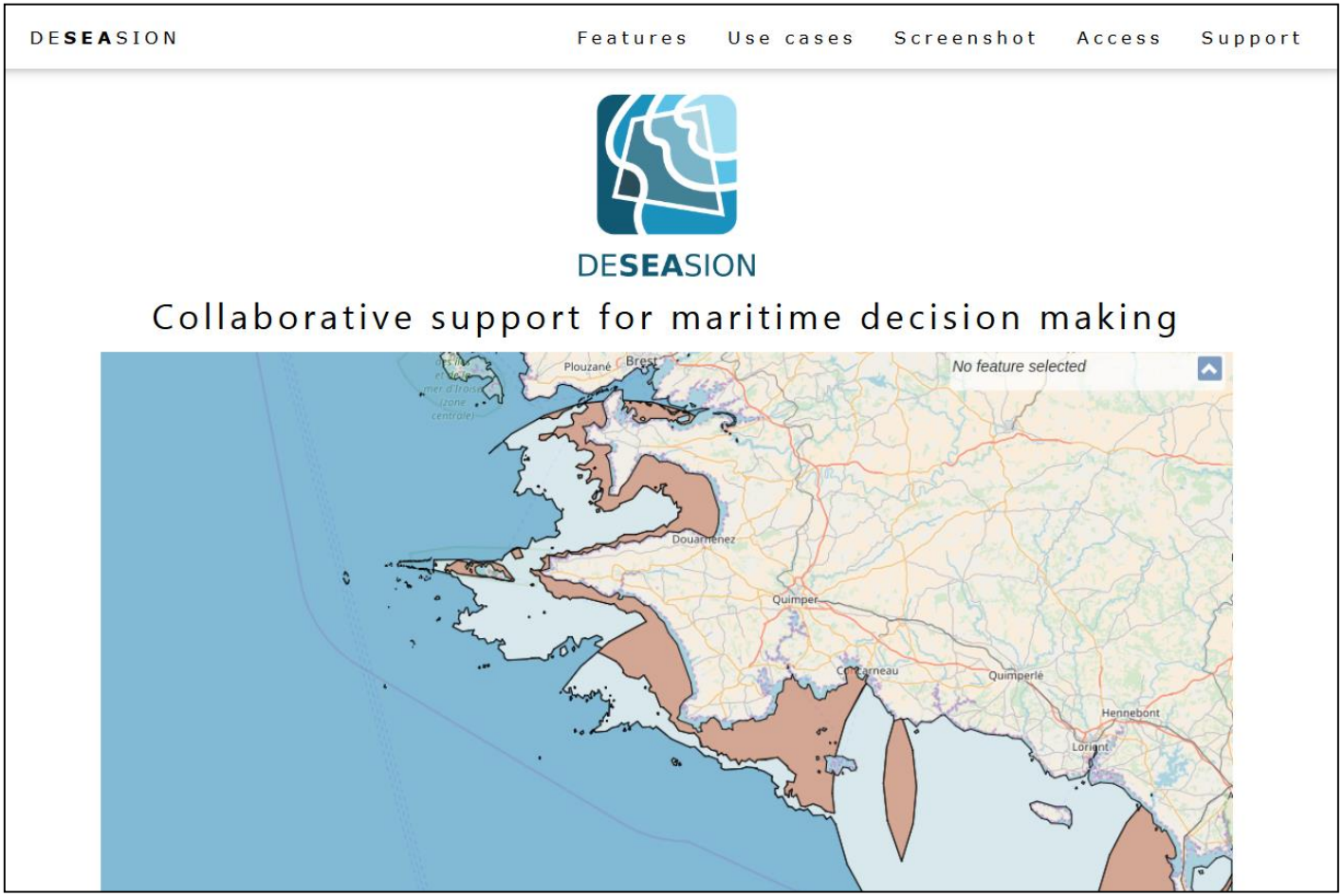
⇒ Combining risk assessment with standard hydrographic expertise

⇒ Using SDB

TOWARD A DECISION TOOL : THE DESEASION PLATFORM

DESEASION :

Multi-Criteria Decision Support (MCDA) + Geographic Information System (GIS)



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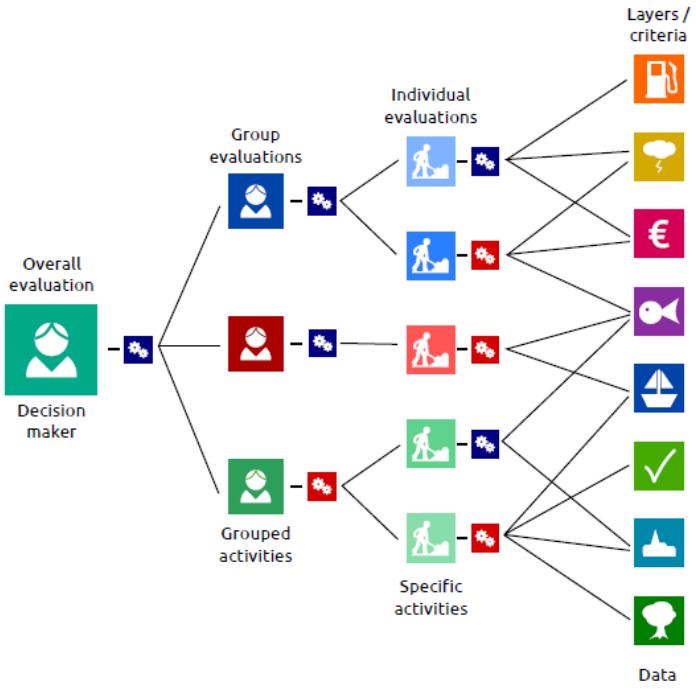
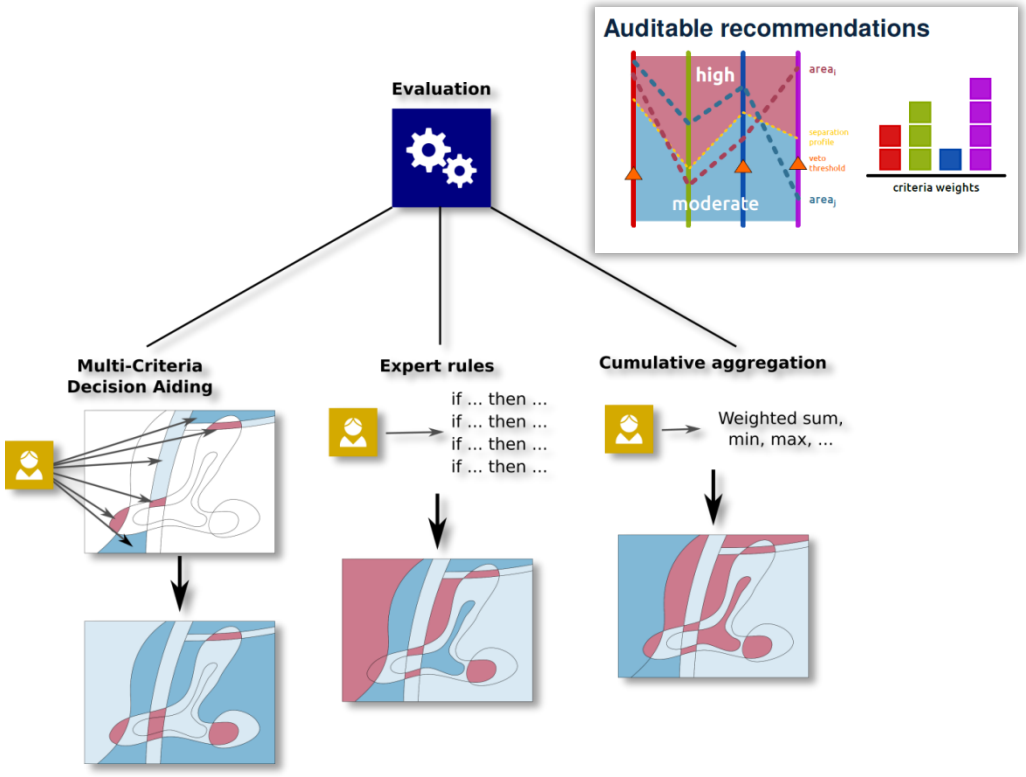
Lab-STICC

- **Hierarchical structuring** of the decision problem including multiple objectives and multiple stakeholders





- **Evaluation** : generation of areas / constraints expressed by the decision makers

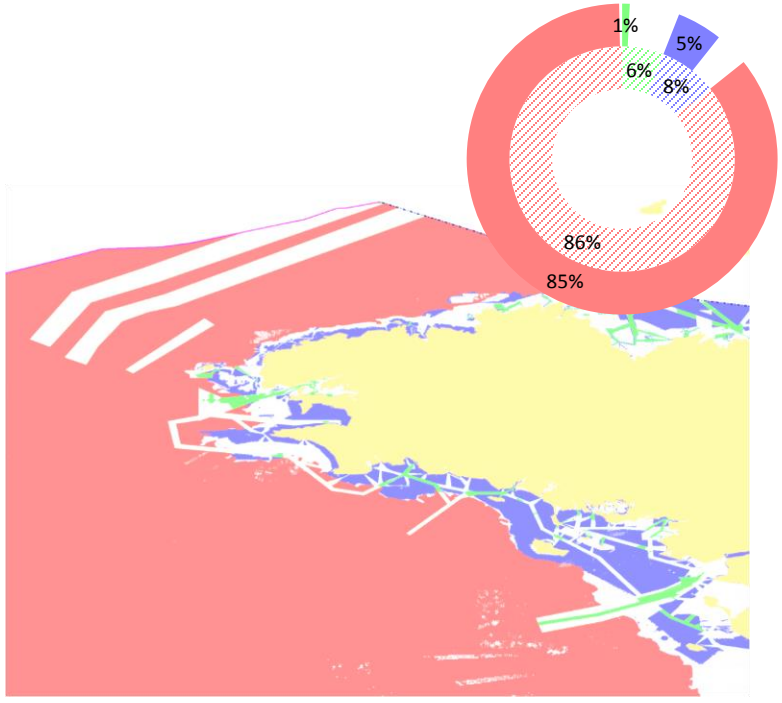
To date

Survey quality as a function of CATZOC

⇒ State of knowledge

Identification of deficiencies

⇒ Survey quality expected (water depths, vessel traffic, buoyage system, recommended track, safety zone)



Improvments expected with Deseasion

Interest in incorportating :

⇒ Seabed evolution (using SDB)
⇒ Ship type
⇒ Localisation information
⇒ Seabed complexity
⇒ Others information …

Implementation of a Hydrographic Risk Assessement

Cost-Benefit Analysis

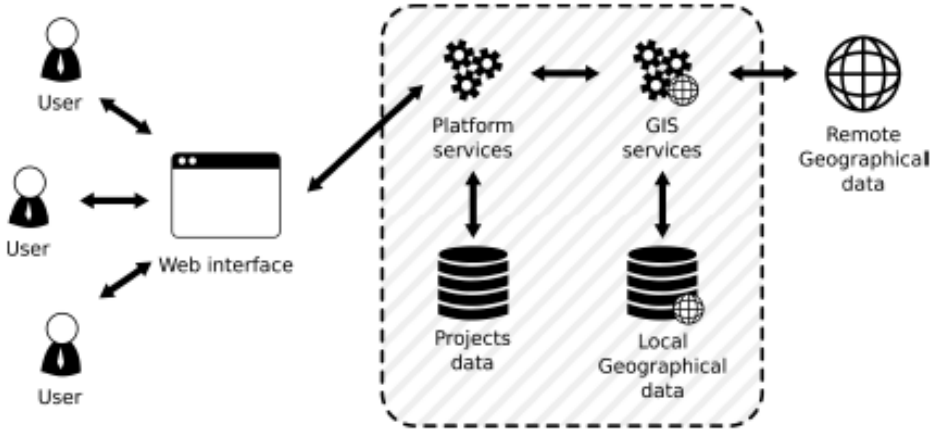
Overall objectives

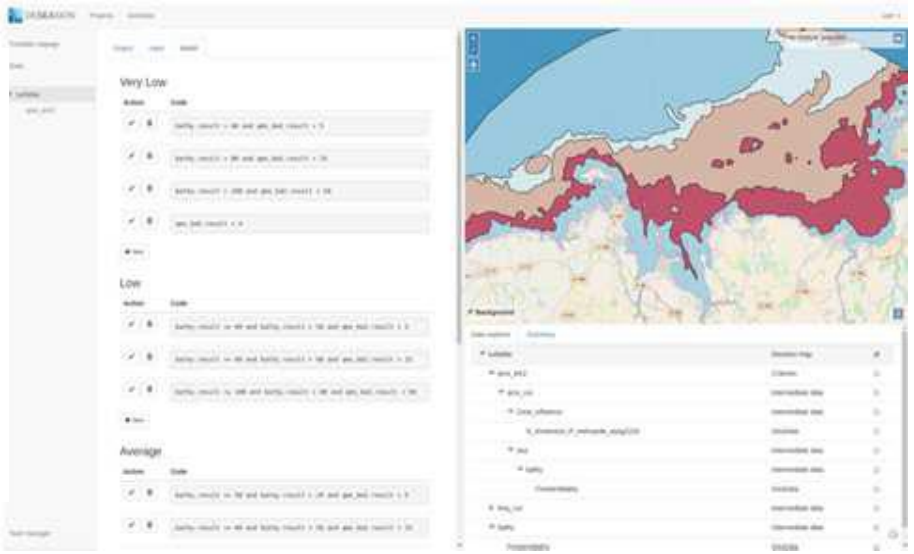
⇒ Functionality : designed to be modular

⇒ Transparency : visualisation of each intermediate result

⇒ Planning : elaborates recommendations to identify priority areas.

⇒ Collaborative : brings together the different actors, locally or remotely





THANKS !